



Opteon™ 2P50

Developmental Dielectric Heat Transfer Fluid

Technical Information

Introduction

In response to the growing need for high-performance products with a low global warming potential (GWP), Chemours has developed a new heat transfer solution, Opteon™ 2P50, a developmental dielectric fluid for use in two phase immersion and electronic cooling applications.

Opteon™ 2P50 is a developmental proprietary hydrofluoroolefin fluid with zero ozone depletion potential (ODP) and a very low GWP of 10 (AR6). Opteon™ 2P50 provides excellent physical properties and performance characteristics as an immersion fluid: it is colorless, nonflammable, and safe to use in the intended application.

Opteon™ 2P50 has no flash point, an auto-ignition temperature of 554°C (1029.2°F), and a boiling point of 48.9°C (120.0°F), making it appropriate for replacing PFPEs, HFEs, FKs, and PFCs in immersion cooling applications.

Physical, Dielectric, and Environmental Properties

Property	Units	Opteon™ 2P50
Boiling Point	°C (°F)	48.9 (120.0)
Liquid Density at 25°C	g/cm ³	1.456
Vapor Pressure at 25°C	MPa	0.040
Vapor Flammability, ASTM E-681	% vol	none
Solubility of H ₂ O at 25°C	ppm	145
Liquid Viscosity at 25°C	cP	0.62
Critical Temperature	°C (°F)	176 (348.8)
Critical Pressure	MPa	2.7
Surface Tension at 25°C	N/m	0.011
Heat of Vaporization at Boiling Pt.	kJ/kg·K	115
Liquid Thermal Conductivity at 25°C	W/m·K	0.073
Liquid Specific Heat at 25°C	kJ/kg·K	1.09
Global Warming Potential (AR6)	100-yr ITH	10
Ozone Depletion Potential (ODP)	—	0
Dielectric Constant (ASTM D924)	N/A	1.82
Volume Resistivity (ASTM D1169)	Ohm·cm	5.1x10 ¹⁴
Breakdown Voltage (ASTM D877) (IEC 60156)	kV/0.1 in	41.3
	kV/2.5mm	59
Flash Point (ASTM D93)	°C (°F)	none
Auto-Ignition Temp (ASTM E659)	°C (°F)	554 (1029.2)
Occupational Exposure Limit (8 hour time-weighted average)	ppm	200



Material Compatibility

Metals

Opteon™ 2P50 developmental heat transfer fluid is compatible with most metals. Exposures to stainless steel, copper, brass, and aluminum up to 175°C (347 °F) for 1 week showed good stability as summarized below. Opteon™ 2P50 is not compatible with strong bases; therefore, contact with highly basic process materials is not recommended. Contact with strong Lewis acids, such as aluminum trichloride, alkali and alkaline earth metals, powdered metals, and powdered metal salts, is also not recommended.

Metal	Weight Change (%)	Solvent Appearance	Fluoride IC (ppm)
Aluminum	< 0.01	Clear, colorless	< 0.2 ppm*
Copper	< 0.01	Clear, colorless	< 0.2 ppm*
Brass	< 0.01	Clear, colorless	< 0.2 ppm*
Zn-plated steel	< 0.01	Clear, colorless	< 0.2 ppm*
Indium foil	-0.27	Clear, colorless	< 0.2 ppm*

Plastics

Opteon™ 2P50 is compatible with most plastics. Exposure to plastics at 80°C for 2 weeks according to a modified ASHRAE 97 method showed good compatibility. Consult with your local Chemours representative to help answer questions about specific materials compatibility in your application.

Plastic	Weight Change (%)	Volume Change (%)	Hardness Change (pts, Shore A hardness)	Rating ¹
Nylon resin - Zytel® 330	-0.3	2.4	1	0
Nylon 6,6 - Zytel® 101	-0.3	-0.1	0	0
Torlon® polymer	-0.3	0.0	<-0.1	0
Ryton® polymer	<-0.1	0.0	0	0
Teflon™	4.1	4.8	-1	0
HDPE	0.5	-0.9	-1	0
Polyurethane	-1.0	-0.3	2	0
Polypropylene	1.5	0.2	1	0
Polycarbonate	<-0.1	0.0	-1	0
PEEK	<-0.1	0.8	<-0.1	0
Bakelite	-0.7	0.8	1	0

Elastomers

Exposure to elastomers at 80°C for 2 weeks according to a modified ASHRAE 97 method are shown. Some reversible swelling is expected with partially fluorinated elastomers. Consult with your local Chemours thermal management representative to help answer questions about specific materials compatibility in your application.

Elastomer	Weight Change (%)	Volume Change (%)	Hardness Change (pts, Shore A hardness)	Rating ¹
Neoprene C1276 -70	-0.2	0.4	0	0
Neoprene C0873-70	0.2	0.0	0	0
Epichlorohydrin	-0.1	-0.2	-1	0
Butyl rubber	1.9	0.5	-3	0
EPDM	1.2	0.4	-2	0
Fluorosilicone	16.9	12.6	-15	2
HNBR nitrile	1.1	1.3	-2	0
NBR nitrile	<-0.1	3.3	0	0
Fluorocarbon FKM	14.0	16.3	-12	2
Natural Rubber	1.4	2.6	0	0
Silicone Rubber	4.3	3.3	-4	0

Additional material compatibility data obtained by Soxhlet extraction—as per Open Compute Project (OCP) guidelines—are available upon request.

Storage and Handling

Opteon™ 2P50 is thermally stable and does not oxidize or degrade during storage. It exhibits no flash point and is designated as a nonflammable liquid (ASTM D56). Refer to the Safety Data Sheet (SDS) and PUSH document for additional safety and handling information.

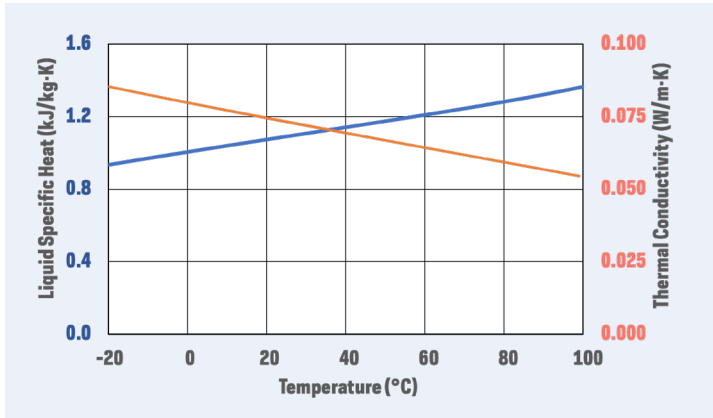
¹Rating: 0 = excellent compatibility, 1 = acceptable, 2 = poor compatibility

*Minimum detection limit

Temperature-Dependent Properties

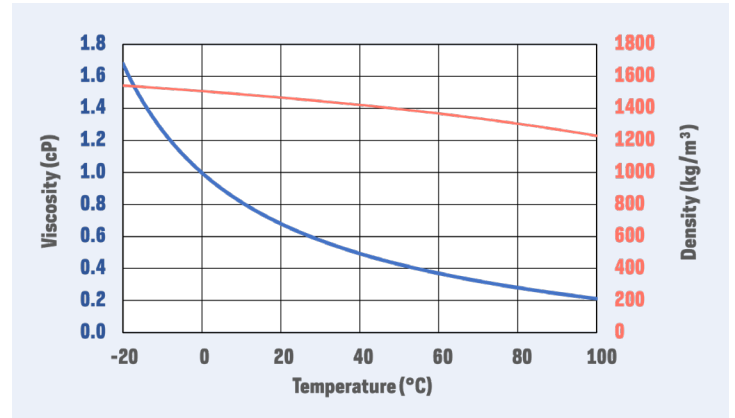
Liquid Specific Heat & Thermal Conductivity

The temperature dependence of liquid thermal conductivity and of liquid specific heat for Opteon™ 2P50.



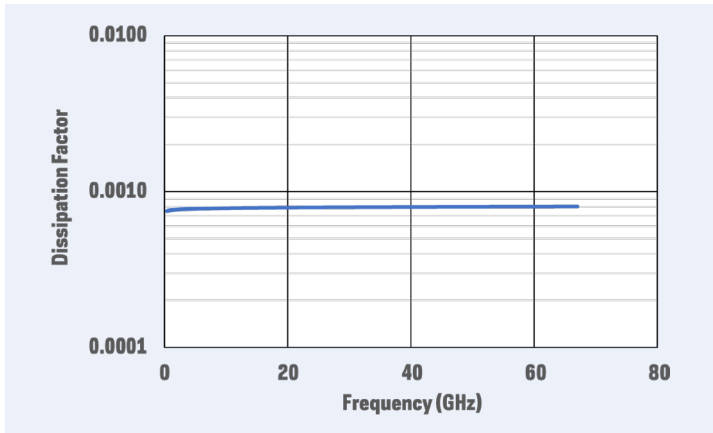
Liquid Viscosity & Density

The temperature dependence of liquid viscosity and of liquid density for Opteon™ 2P50.



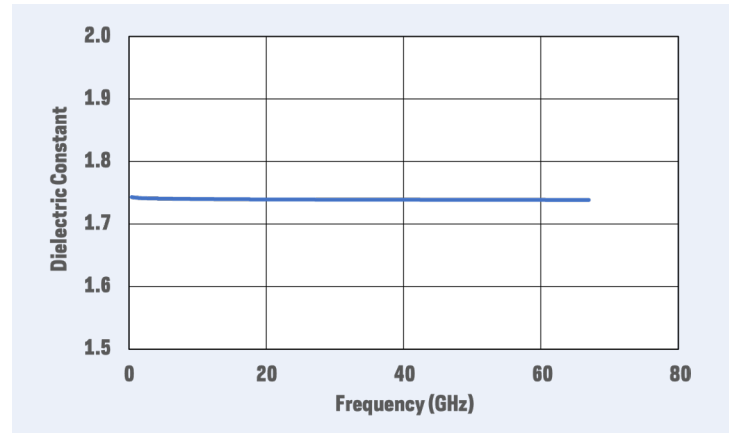
Dissipation Factor

The frequency dependence of dissipation factor for Opteon™ 2P50.



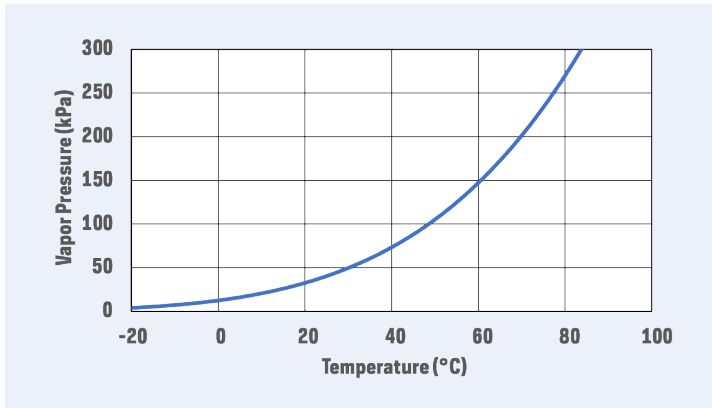
Dielectric Constant

The frequency dependence of dielectric constant for Opteon™ 2P50.



Vapor Pressure

The temperature dependence of vapor pressure for Opteon™ 2P50.



For more information on the Opteon™ family of refrigerants, or other refrigerants products, visit opteon.com or call (800) 235-7882.

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